

AD-A098 593

AVCO SYSTEMS DIV WILMINGTON MA

MINUTEMAN III/MARK 12A REENTRY VEHICLE CARBON-CARBON NOSETIP PR-ETC(U)

APR 80

F04704-80-C-0011

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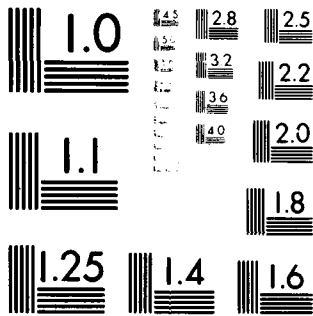
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AVSD-0125-80-CR

1 of 1
AD-A098 593



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MICROCOPY RESOLUTION TEST CHART

NATIONAL BUREAU OF STANDARDS-1963-A

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12/5/80

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SYSTEMS DIVISION

31 LOWELL STREET, WILMINGTON, MASSACHUSETTS 01887

TEL: (617) 657-2433

15 April 1980
S300-DJM-80-68

PLS-5

AD A098593

Department of the Air Force
Ballistic Missile Office
Norton Air Force Base
San Bernardino, CA 92409

Attention: MNNR/Captain G. Parnell

Gentlemen:

Subject: Transmittal of Avco Document AVSD-0125-80-CR,
General Test Report, MMIII/MK12A Reentry Vehicle,
Carbon/Carbon Nosetip Production, dated 14 April 1980.
Contract F04704-80-C-0011

Reference: A. Subject Contract, Attachment 1, Task 4.2.1.1
B. CDRL Sequence Number 081A2
C. CDRL Sequence Number 080A2

The subject document is transmitted herewith in accordance with Reference A and in compliance with Reference B and as formatted in Reference C.

Avco requests that BMO review and approve this document within thirty (30) days.

Very truly yours,

Donald J. McQueen

D. J. McQueen
Program Manager

STIC
MAY 7 1981
A

cc: (w/o enclosure): Avco/SD, Attention: Mr. D. J. Sullivan, Contracts Adm.
BMO/MNCA-1, Attention: Mr. C. Howard Kirk

Enclosure: Subject Document

WILL COPY

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EXTERNAL DISTRIBUTION

Department of the Air Force
Ballistic Missile Office
Norton Air Force Base
San Bernardino, CA 92409
Attention: MNNR

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Ballistic Missile Office
Norton Air Force Base
San Bernardino, CA 92409
Attention: MNCA-1

(Letter only)

TRW Systems (CADM)
P.O. Box 1310
Norton Air Force Base, CA 92409

(3)

San Antonio Air Logistics Center
Kelly Air Force Base, TX 78241
Attention: MMETC

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Battelle Columbus Laboratories
Metals and Ceramics Information Center
Attention: D. L. Maybuth
505 King Avenue
Columbus, Ohio 43201

(1)

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(9) GENERAL TEST REPORT. 1 Jan-Mar 80. (32)

PRODUCTION LOT SAMPLING

(17) AVSD-0125-80-CR

(6) MINUTEMAN III/MARK 12A REENTRY VEHICLE
CARBON-CARBON NOSETIP PRODUCTION.
~~CONTRACT F04784-80-C-0011~~
CDRL SEQUENCE NUMBER 081A2

(REPORT PERIOD 1 JANUARY 1980 - 31 MARCH 1980)

(12) 9

(11) 14 APR 1980

(15) F04784-80-C-0011

Prepared By

AVCO SYSTEMS DIVISION
201 Lowell Street
Wilmington, Massachusetts 01887

Prepared For

DEPARTMENT OF THE AIR FORCE
BALLISTIC MISSILE OFFICE
Norton Air Force Base
San Bernardino, California 92409

This document has been approved
for release and sale; its
distribution is unlimited.

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FOREWORD

As required one (1) densified billet out of each thirty-six (36) processed is randomly selected and subjected to the Production Lot Sampling Tests specified in paragraph 5.2.3 of the Equipment Test Plan, AVSD-0115-80-CR, dated 4 April 1980. This particular PLS (#5) was taken from General Electric Densification Lot number 6. The ten (10) nosetip assemblies delivered under the subject contract were taken from this lot. All of the test results obtained were within specification limits and there are no anomalies to be reported. All data has been compiled on previously presented Figures 7, 8, and 9 from the Equipment Test Plan, and included herein as the General Test Report, Production Lot Sampling, in accordance with CDRL Sequence Number 081A2.

PLS SUMMARY DATA SHEET
TYPE 11 CARBON/CARBON BILLET

BILLET S/N K9000-46 (PLS #5) _____

PREFORM S/N (P1441A) F900852 _____

DENSIFICATION LOT(S) 6 _____

BILLET SIZE $8.059 \times 3.237 \times 3.237$ _____

BILLET WEIGHT 2728.1 grams _____

BULK DENSITY 1.971 gms/cc _____

RADIOMETRIC DENSITY

EDGE TO CORE RATIO 0.9978 _____

END TO END GRADIENT 0.0008 _____

SIDE TO SIDE GRADIENT 0.015 _____

OPEN POROSITY 4.41% _____

FRACTURES (X) None _____

& INCLUSIONS (Y) None _____

VISUAL INSPECTION Accept _____

PREFORM DATA SUMMARY

MISSING/DISPLACED YARN

BUNDLES (Z) None _____

FIBER ORIENTATION W/In 2° _____

Z AXIS BENDING None _____

Z ELEMENT SPACING W/In $\pm .005$ _____

XY LAYER SPACING W/In $\pm .002$ _____

BULK DENSITY 1.081 gms/cc _____

DENSITY GRADIENT 0.064 gm/cc _____

Figure 7

PLS SUMMARY DATA SHEET
MECHANICAL PROPERTIES - TYPE II CARBON/CARBON BILLETS

BILLET S/N K900046 (P1441A) PLS #5

<u>PROPERTY</u>	<u>TEST SPECIMEN</u>	<u>TEST VALUE</u>	<u>REQUIREMENT (MIN.)</u>
ULTIMATE TENSILE STRENGTH			
X	TX-1	<u>27600</u>	18200 PSI
	TX-2	<u>33800</u>	
	TX-3	<u>30200</u>	
	TX-4	<u>32500</u>	
Z	TZ-1	<u>27200</u>	16500 PSI
	TZ-2	<u>26800</u>	
	TZ-3	<u>28500</u>	
TENSILE MODULUS			
X	TX-1	<u>15.0</u>	8.5 x 10 ⁶ PSI
	TX-2	<u>13.6</u>	
	TX-3	<u>15.1</u>	
	TX-4	<u>14.5</u>	
Z	TZ-1	<u>12.3</u>	9.4 x 10 ⁶ PSI
	TZ-2	<u>11.8</u>	
	TZ-3	<u>11.8</u>	
COMPRESSIVE YIELD STRENGTH			
X	CX-1	<u>19100</u>	15200 PSI
	CX-2	<u>18900</u>	
	CX-3	<u>18400</u>	
Z	CZ-1	<u>16900</u>	11000 PSI
	CZ-2	<u>18400</u>	
	CZ-3	<u>16900</u>	

Figure 8

PLS SUMMARY DATA SHEET
MECHANICAL PROPERTIES - TYPE II CARBON/CARBON BILLETS

BILLET S/N K900046 (P1441A) PLS#5

<u>PROPERTY</u>	<u>TEST SPECIMEN</u>	<u>TEST VALUE</u>	<u>REQUIREMENT</u> <u>(MIN.)</u>
COMPRESSIVE MODULUS			
X	CX-1	<u>13.8</u>	11.2 x 10 ⁶ PSI
	CX-2	<u>13.0</u>	
	CX-3	<u>12.4</u>	
Z	CZ-1	<u>10.6</u>	8.4 x 10 ⁶ PSI
	CZ-2	<u>10.9</u>	
	CZ-3	<u>9.7</u>	
45° XY TENSION, .1% OFFSET YIELD			
	TXY-1	<u>4170</u>	3500 PSI
	TXY-2	<u>3830</u>	
TORSIONAL SHEAR, .2% OFFSET YIELD			
	TS-1	<u>1000</u>	950 PSI
	TS-2	<u>1030</u>	

PLS SUMMARY DATA SHEET
TYPE II CARBON/CARBON BILLET

THERMAL PROPERTIES

BILLET S/NK900046(P1441A)PLS#5

<u>PROPERTY</u>	<u>TEST SPECIMEN</u>	<u>TEST VALUE</u>	<u>REQUIREMENT</u>
THERMAL EXPANSION			$\Delta L/L \times 10^3$ IN/IN @ 4000°F
X @ 4000°F	TEX-1	<u>3.59</u>	3.2 TO 4.1
	TEX-2	<u>3.62</u>	
Z @ 4000°F	TEZ-1	<u>3.50</u>	3.1 TO 4.1
	TEZ-2	<u>3.59</u>	
THERMAL CONDUCTIVITY			BTU IN/HR FT ² OF
Z @ 500°F	TCZ-1	<u>627</u>	580 - 740
Z @ 1500°F	TCZ-1	<u>460</u>	410 - 520
X @ 500°F	TCX-1	<u>901</u>	770 - 1010
X @ 1500°F	TCX-1	<u>585</u>	500 - 655

Figure 8 (Concluded)

PLS SUMMARY DATA SHEET (FOR PLS BILLETS ONLY)
 TYPE II CARBON/CARBON BILLET

BILLET S/N K900046 (PLS #5)

PREFORM S/N (P1441A) F900786

FABRIC ACCEPTANCE DATA

WEAVER Textile Products

LOT NUMBER 232

DEFECTS Accept

CONTAMINATION Accept

WEAVE CONSTRUCTION 8 Harness Satin

VOLATILE CONTENT 4.67

YARN COUNT 29 Warp 29 Fill

WEIGHT 5.188 oz./sq. yd.

THICKNESS .013

BREAKING STRENGTH 228.0 Warp 229.8 Fill

YARN ACCEPTANCE DATA

TYPE	LOT NO.	TENSILE STRENGTH (PSI)	MODULUS X 10 ⁶ PSI	DENIER gm/9000M	DENSITY gm/cc
HM-1000 PAN (For Fabric)	118-2	405 x 10 ³	57.0	13469	1.842
HM-3000 PAN (For Rods)	97-3	320 x 10 ³	54.0	4618	1.832

DATE
ILME